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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/089,220	08/19/2002	Michael Thompson	PAT 457W-2	2976

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EXAMINER
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PANARO, NICHOLAS J

ART UNIT	PAPER NUMBER
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1637

DATE MAILED: 12/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/089,220	<b>Applicant(s)</b> THOMPSON ET AL.	
	<b>Examiner</b> Nicholas J. Panaro	<b>Art Unit</b> 1637	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☐ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |  |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>2/25/04</u> | 6) <input type="checkbox"/> Other: ____  |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

**Claims 1-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

a) Claims 1-10 are indefinite in Claim 1 for the following reasons: indefinite in step (i) because "said sensor device" lacks antecedent basis; indefinite in step (ii) because "the predetermined parameters" lacks antecedent basis in the preceding steps; indefinite in step (iii) because "said measured parameters" lacks antecedent basis in the preceding steps.

b) Claim 4 is indefinite in Claim 1 because "the surrounding liquid medium" lacks antecedent basis.

**Claim 3 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

Claim 3 states an experimental observation. Thus, Claim 3 is indefinite in that it does not further limit the process of Claim 1.

**Claims 11-13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

Claims 11-13 are indefinite in Claim 11 for the following reasons: indefinite in step (b) because "the current" lacks antecedent basis in the preceding steps; indefinite in step (d) because "the measured impedance" lacks antecedent basis in the preceding steps.

Claim 13 is indefinite because "the sensor surface" lacks antecedent basis.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

**Claims 11-13 are rejected under 35 U.S.C. 102(b) as being anticipated by Ferrante et al (J. Appl. Phys. 76(6): 3348-3462, 15 September 1994).**

Regarding Claim 11, Ferrante et al teach a method of determining the efficiency of acoustic coupling between a sensor and the surrounding fluid, said method comprising: (a) applying an electric signal of known frequency and voltage to the sensor; (b) measuring the current through the sensor to determine the impedance at the known frequency; (c) repeating steps (a) and (b) over a range of frequencies to generate a set of impedance data; and (d) fitting the measured impedance data to determine an  $\alpha$  parameter which represents coupling strength (pg. 3458, Column 2 – pg. 3459, Column 1).

Regarding Claim 12, Ferrante et al teach a method wherein the  $\alpha$  parameter is other than 1 (pg. 3459, Column 1).

Regarding Claim 13, Ferrante et al teach the magnitude of the said  $\alpha$  parameter is dependent on molecular mass (pg. 3460, column 2, line 51 – pg. 3461, column 2, line 53).

Art Unit: 1637

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cavic et al (Faraday Discuss. 107: 159-176, 1997) in view of Hefti (U.S. Patent 6,287,874), Ferrante et al (J. Appl. Phys. 76(6): 3448-3462) and Maracas (U.S. Patent 6,060,023).**

Regarding Claim 1, Cavic et al teach a process of sensing molecular changes comprising the steps of (a) exciting a sensor device at a series of predetermined frequencies, (b) collecting data to determine values for predetermined parameters (e.g., series resonance frequency, resistance) and (c) determining relative changes in said measured parameters. Hefti teaches the measurement of frequency, resistance, inductance and capacitance to detect a molecular binding event. Ferrante et al teach the measurement of a boundary layer slip parameter (i.e., interfacial slip parameter) to detect molecular structural shape (i.e., molecular slip) (pg. 3449, Column 1, lines 24-32).

Regarding Claim 2, Cavic et al teach the correlation of said parameters to determine a value for the molecular conformation and/or molecular mass (pp. 170-171, Figure 7).

Regarding Claim 3, as stated above Claim 3 was not found to further limit Claim 1.

Regarding Claim 4, Cavic et al teach changes in molecular mass or conformation which is generated by an interaction between entities bound to a sensor and molecules in the

Art Unit: 1637

surrounding liquid medium (i.e., adsorption of neutravidin to a gold electrode; pp 170-171, Figure 7).

Regarding Claim 5, Cavic et al teach entities bound to a sensor wherein the entities are proteins (pp. 166-171) or nucleic acids (pp. 171-174). Furthermore, Maracas teaches entities bound to a sensor (i.e., a Bio-Assay Device) wherein the entities are nucleic acids (Column 7, lines 28-38, Claim 1) and Hefti teaches a sensor entities bound to a sensor wherein the entities are nucleic acids (Column 18, line 51 – Column 19, line 30; Figure 2A).

Regarding Claim 6, Cavic et al teach entities bound to a sensor wherein the entities are proteins (pp. 166-171). Furthermore, Maracas teaches proteins bound to a sensor (i.e., a Bio-Assay Device) wherein the proteins are antibodies, enzymes, molecular receptors, receptor ligands and polypeptides (Column 6, lines 23-45).

Regarding Claim 7, Cavic et al teach entities bound to a sensor wherein the entities are nucleic acids (e.g., RNA, pp. 171-174). Furthermore, Maracas teaches nucleic acids bound to a sensor (i.e., a Bio-Assay Device) wherein the nucleic acids are DNA or RNA (Column 2, lines 35-38).

Regarding Claim 8, Cavic et al teaches proteins in liquid medium in contact with a sensor. Hefti teaches proteins and nucleic acids in a liquid medium in contact with a sensor (Column 6, lines 23-45).

Regarding Claim 9, Cavic et al teaches proteins in liquid medium in contact with a sensor (pg. 160, first full paragraph). Hefti teaches proteins in a liquid medium which are selected from the group consisting of antibodies, enzymes, molecular receptors, receptor ligands and polypeptides (Column 6, lines 23-45).

Art Unit: 1637

Regarding Claim 10, Cavic et al does not teach nucleic acids in liquid medium in contact with a sensor (i.e., peptides, pp. 160, line 14). However, Hefti teaches nucleic acids in a liquid medium which are selected from the group consisting of DNA, RNA and oligonucleotides (Column 6, lines 23-45).

Cavic, Hefti, Maracas and Ferrante all teach similar methods for sensing molecular changes by measuring various electrical properties of the molecules during the change (e.g., during a binding reaction). While none of the references individually teach measurement of all the claimed electrical characteristics, Maracas teaches their preferred measuring device measures numerous electrical properties (e.g., inductance, capacitance, impedance, Column 3, lines 25-30). This teaching clearly suggests their desire and/or need for measuring all electrical characteristics. Further, Ferrante teaches the slip parameter is important for characterizing molecules in liquid at a surface (Abstract). Therefore, it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to combine the teachings of Cavic, Hefti, Maracas and Ferrante and to measure all the claimed characteristics based on Ferrante's teaching of the importance of characterizing molecules in liquid at a surface and further based on Maracas suggested complete characterization of molecular interactions.

### ***Conclusion***

Claims 1-13 are rejected. No claims allowed.

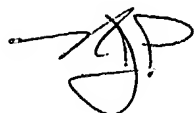

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicholas J. Panaro whose telephone number is (571) 272-0778. The examiner can normally be reached on Monday - Friday 7:00 am to 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Benzion can be reached on (571) 272-0782. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 1637

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

NJP

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**BJ FORMAN, PH.D.  
PRIMARY EXAMINER**